

EXPLORATION

“Houston: We Are Go For Exploration!”



NASA Johnson Space Center

Why do we need a space suit?

micrometeoroid and orbital debris protection

- Temperature extremes
- Oxygen
- Pressure

protection from dust and rocks

EXPLORATION

Scientific Method



Past Space Suits

Mercury Program



Gemini Program



Apollo Program



Mercury Space Suits



Operating Pressure:
3.7 psi (25.5 kPa)

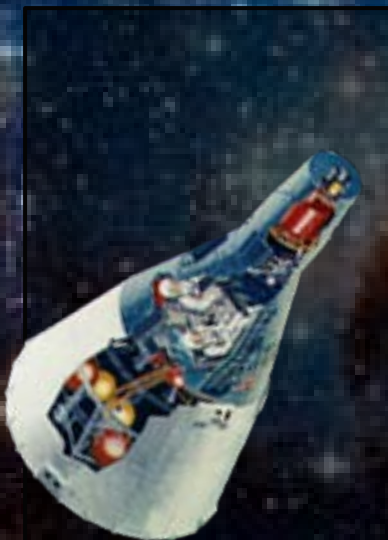


Mercury Crew
Capsule

Gemini Space Suit



Operating Pressure:
3.7 psia (25.5 kPa)



Gemini Crew Capsule

Apollo Space Suits



Operating Pressure:
3.7 psia (25.5 kPa)



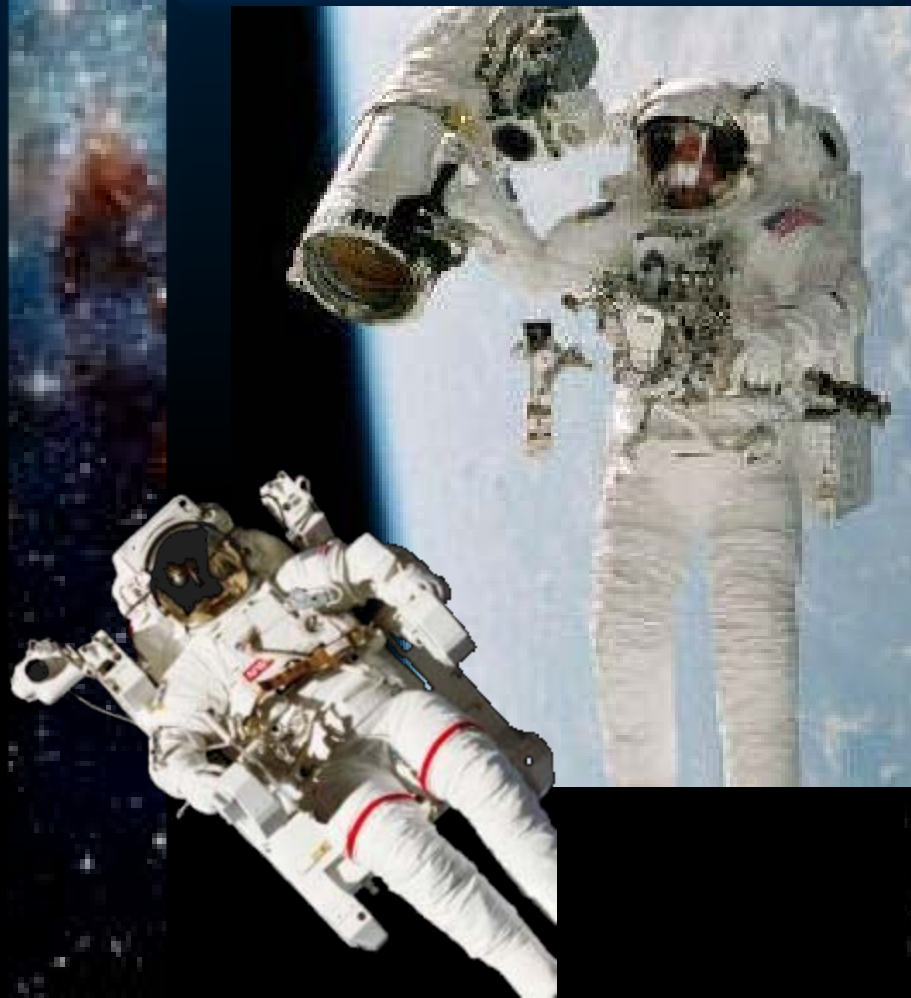
Apollo Command
Module with Lunar
Lander

Present Space Suits

Advanced Crew Escape Suit (ACES)



Extravehicular Mobility Unit (EMU)



Advanced Crew Escape Suit



Operating Pressure:
3.46 psi (23.9 kPa)



Space Shuttle

Extravehicular Mobility Unit (EMU)



Operating Pressure:
4.3 psi (29.6 kPa)



International Space
Station

Internal Components of the EMU

It's like your air conditioner, but uses water instead!



Liquid Cooling and Ventilation Garment (LCVG)

Communications Carrier Assembly (CCA)



Suit Engineer
(2006)



Neil Armstrong
(1969)

Independent microphones and earphones

Modular Components of the EMU



Helmet and
Extravehicular Visor
Assembly (EVVA)



Hard Upper Torso (HUT) and Arm Assembly



Gloves

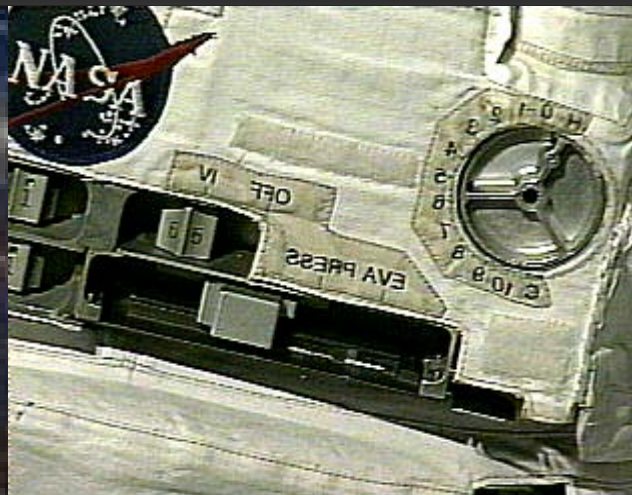


Boot and Foot Restraint

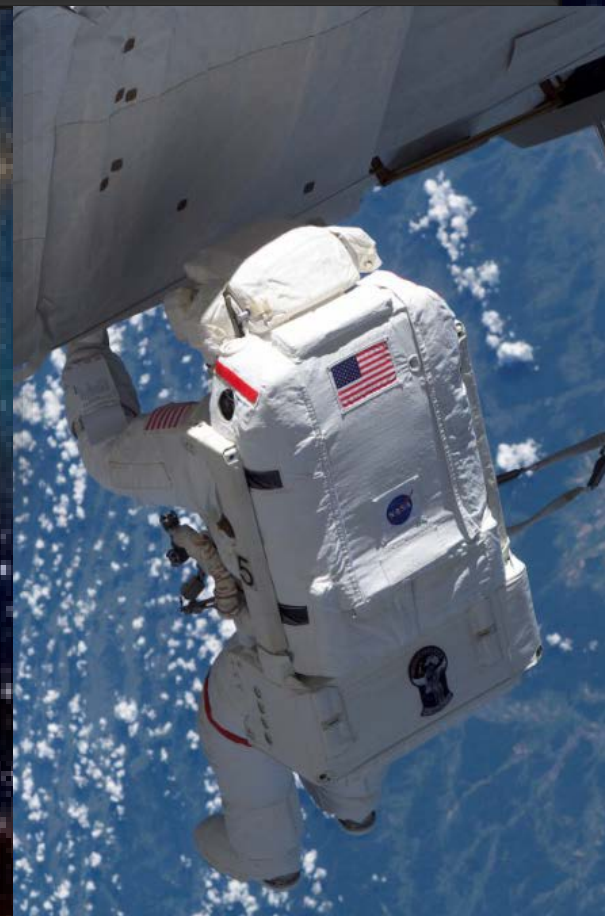


Lower Torso Assembly (LTA)

EMU Controls and Life Support



Display and Controls Module:
temperature, pressure, ventilation
and communication controls



Portable Life Support System

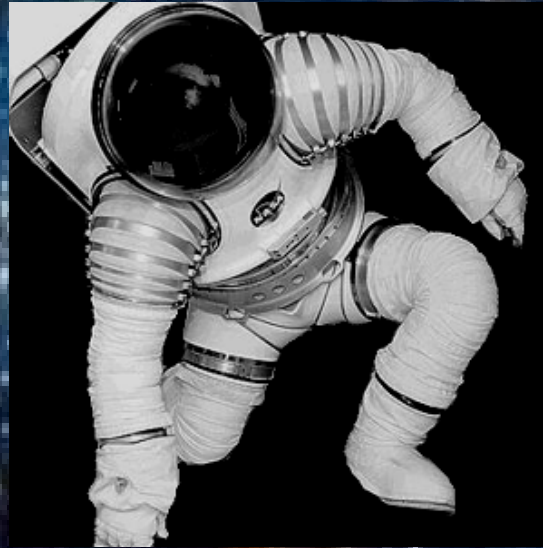
Apollo 16: Charles Moss Duke, Jr. (Duke)



What about a suit for future exploration?



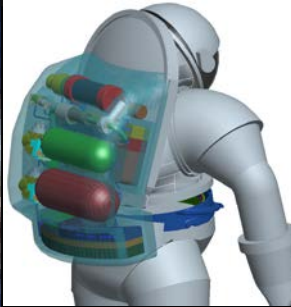
Mark III Suit



Rear Entry I-Suit (REI-Suit)



Suit Development Using the Scientific Method



Concept
Development



Component Testing



System
Testing



Integrated
Testing

Develop innovative concepts to meet
challenging requirements

Test parts and refine designs per test results

Test system and refine per test results

Integrate hardware to test how it works together

Questions?

